early differentiated into the two groups of Apneumatocœla and Pneumatocœla, the former being the root-stock of the modern Elasmobranchii, while the latter, by acquiring rudimentary and more or less functional lungs, became the primitive double-breathers from which have been derived the Ganoidei and the Amphibia. From the primitive Ganoidei were derived the Teleosteoid Ganoids and eventually the Teleostei also, their originally complex swim-bladders becoming gradually devoted to other functions, while the Selachoidei may be regarded as the but little modified descendants of the original progenitors of the order. The close correspondence that exists between *Polyodon* and the Selachii is not incompatible with these views, but may be the result of the persistence in both of structures originally possessed by their primitive ancestor. Two facts in the cranial anatomy of *Polyodon* are not easy to explain, viz., the formation of the upper jaw and the existence of the "orbitar process." The union of the pterygoid processes in a median symphysis may have been the primitive condition of the jaws in the ancestral form (*x*), but that while persistent in *Polyodon* and in the Selachii, it was superseded by a different arrangement, viz., the union of the pterygoid processes with retral palatine outgrowths in most Ganoidei, and in all Teleostei and Amphibia. Neither is it easy to account for the retention of the "orbitar process." It may have been an adaptive modification correlated with a suctorial mouth in the larval or adult forms of those Ganoids that were first differentiated from the Amphibian stem, and independently developed; or it may have been possessed by, and similarly functioned in, the primitive Pneumatocœla, but has become obsolete in all their descendants, except *Polyodon* and the Anura. Thus it would appear that the Polyodontidæ constitute a remarkably central group. They retain not a few of the characters which we may assume to have belonged to the primitive stock out of which were evolved the three most important groups of Ichthyopsida, combined, however, with a certain amount of specialization; nor are they altogether without indications of retrogression.

V. "On *Astrophiura permira*, an Echinoderm-form intermediate between Ophiuroidea and Asteroidea." By W. Percy Sladen, F.L.S., F.G.S. Communicated by Professor Duncan, F.R.S. Received June 18, 1878.

(Abstract.)

The following peculiarities of structure presented by the anatomy of the echinoderm above described are noteworthy:—

1. The combination of ophiuroid disk- and arm-structure within a pentagonal asteroid form of body.

2. The asteroid character of the ambulacral system: the divisional plates not only being homologous with, but resembling in the manner of their disposition the ambulacral plates of Asteroidea; at the same time furnishing a highly suggestive representation of their phylogenetic development.

3. The rudimentary structure of the mouth-armature, more asteroid than ophiuroid in general facies. Absence of teeth, jaw-plates, and jaws.

4. Extension of the peritoneal cavity to the extremity of the functional portion of the rays, that is to say, to the margin of the pentagonal body.

5. The extremely rudimentary condition and aborted character of that portion of the brachial series which is prolonged beyond the body-disk.

6. The continuity of the tentacular pore-system limited to the disk only.

The above characters are clearly sufficient to stamp the peculiarity of this extraordinary echinoderm, and, whilst excluding it from any known group of genera by their remarkable nature and by the aberrant departure they present from all previous types, are such as would seem to necessitate the relegation of the form to a family apart by itself.

To speak definitely as to the exact position of intermediacy which the organism holds between the Asteroidea and Ophiuroidea would obviously be premature, without a more detailed examination of the internal anatomy than the present specimen in its dry condition will permit, as well as some knowledge of the life-history of the form. It may however be safely affirmed without overstepping the bounds of due caution, that *Astrophiura* bridges further over, from the ophiuroid side, the differences which have separated the two orders, than any previously described starfish or brittle-star.

VI. "Experimental Researches on the Temperature of the Head." Part II, III, IV.

By J. S. Lombard, M.D., formerly Assistant Professor of Physiology in Harvard University, U.S. Communicated by H. Charlton Bastian, M.D., F.R.S., Professor of Pathological Anatomy in University College, London. Received June 18, 1878.

(Abstract.)

Part II.—*Examination of the Middle Region of the Head.*

This region is divided on each side into 7 tiers by 6 equidistant lines drawn parallel to the longitudinal median line. The tiers are